

2002

DRINKING WATER SURVEILLANCE PROGRAM

**BELLEVILLE
WATER TREATMENT
PLANT**

ANNUAL REPORT 1990

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BELLEVILLE WATER TREATMENT PLANT

DRINKING WATER SURVEILLANCE PROGRAM

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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

BELLEVILLE WATER TREATMENT PLANT 1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Belleville water treatment plant is a conventional treatment plant which treats water from the Bay of Quinte. The process consists of microstrainers, coagulation, flocculation, sedimentation, filtration, fluoridation and disinfection. This plant has a rated capacity of $54.5 \times 1000 \text{ m}^3/\text{day}$. The Belleville water treatment plant serves a population of approximately 36,800.

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Belleville water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A " " INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE		RAW		TREATED		SITE 1		SITE 2	
	TESTS	POSITIVE	TESTS	POSITIVE	TESTS	POSITIVE	TESTS	POSITIVE	TESTS	POSITIVE
BACTERIOLOGICAL	18	11	61	5	0	0	5	3	60	6
CHEMISTRY (FLD)	18	18	100	35	35	100	60	53	88	60
CHEMISTRY (LAB)	132	121	91	129	100	77	223	211	94	223
METALS	144	49	34	144	44	30	276	125	45	276
CHLORODROMATICS	84	0	0	84	0	0	84	0	0	70
CHLOROPHENOLS	12	0	0	12	0	0	0	0	0	0
PAH	101	0	0	101	0	0	0	0	0	0
PESTICIDES & PCB	204	0	0	204	1	0	127	1	0	106
PHENOLICS	6	2	33	6	2	33	0	0	0	0
SPECIFIC PESTICIDES	57	0	0	57	0	0	6	0	0	5
VOLATILES	174	2	1	174	18	10	116	12	10	174
TOTAL	957	204	958	201	897	405	920	378		

DRINKING WATER SURVEILLANCE PROGRAM

BELLEVILLE WATER TREATMENT PLANT 1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Belleville water treatment plant in the spring of 1987. Previous annual reports have been published for 1987, 1988 and 1989.

PLANT DESCRIPTION

The Belleville water treatment plant is a conventional treatment plant which treats water from the Bay of Quinte. The process consists of microstrainers, coagulation, flocculation, sedimentation, filtration fluoridation and disinfection. This plant has a rated capacity of $54.50 \times 1000 \text{ m}^3/\text{day}$. The Belleville water treatment plant serves a population of approximately 36,800.

The sample day flows ranged from $25.0 \times 1000 \text{ m}^3/\text{day}$ to $30.0 \times 1000 \text{ m}^3/\text{day}$.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing

samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count is a test used to supplement routine analysis for coliform bacteria. The limit for standard plate count (at 35°C after 48 hours) in the ODWOs is 500 counts/mL (based on a geometric mean of 5 or more samples). DWSP bacteriological analysis of treated and distributed water was limited to standard plate count.

Standard plate count (membrane filtration) exceeded the ODWO Maximum Desirable Concentration of 500 counts/mL in 4 of 11 distribution water samples with a maximum reported value of 2,400 counts/mL.

INORGANIC & PHYSICAL

CHEMISTRY (FLD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 6 of 17 treated and distributed water samples with a maximum reported value of 23.5°C.

CHEMISTRY (LAB)

Colour in drinking water may be due to the presence of natural or synthetic substances as well as certain metallic ions.

Colour exceeded the ODWO Maximum Desirable Concentration of 5 Hazen Units (HZU) in 2 of 12 distribution water samples with a maximum reported value of 6.5 HZU.

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Aesthetic or Recommended Operational Guideline of 80-100 mg/L in all 18 treated and distributed water samples with a maximum reported value of 134.4 mg/L.

Turbidity in water is caused by the presence of suspended matter such as clay, silt, colloidal particles, plankton and other microscopic organisms. The most important potential health effect of turbidity is its interference with disinfection in the treatment plant and the maintenance of a chlorine residual. The ODWO Maximum Acceptable Concentration for turbidity is 1.0 Formazin Turbidity Units (FTU).

The laboratory turbidity exceeded the Maximum Acceptable Concentration in 2 of 12 treated water samples with a maximum reported value of 4.7 FTU. These results were not confirmed by the more reliable field turbidity results.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant, to avoid problems in the distribution system.

Aluminum exceeded the ODWO Aesthetic or Recommended Operational Guideline of 100 ug/L in 17 of 18 treated and distributed water samples with a maximum reported value of 310.0 ug/L.

Iron exceeded the ODWO Maximum Desirable Concentration of 300 ug/L in 1 of 6 treated water samples with a reported value of 470.0 ug/L. Since other treated water results were all below 10 ug/L, this exceedance is considered anomalous.

ORGANIC

CHLOROAROMATICS

Hexachlorocyclopentadiene was detected at positive levels in the 3 treated and distributed water samples analyzed with a maximum reported value of 315.0 ng/L. The United States Environmental Protection Agency has an Ambient Water Quality Criteria of 206,000 ng/l.

The results of the other parameters in the chloroaromatic scan showed that none was detected above trace levels.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected in the treated or distributed water samples.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

The results of the regular pesticide scan showed that none were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water.

Phenolics exceeded the ODWO Aesthetic or Recommended Operational Guideline of 2 ug/L in 1 of 6 treated water samples with a reported value of 4.4 ug/L.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in the 16 treated and distributed water samples analyzed with a maximum level of 132.7 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

Chloroform was detected at trace levels in 4 of 6 raw water samples indicating that chlorine may have been in contact with the raw water prior to sampling.

CONCLUSIONS

The Belleville water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

No known health related guidelines were exceeded.

FIGURE 1
BELLEVILLE WATER TREATMENT PLANT

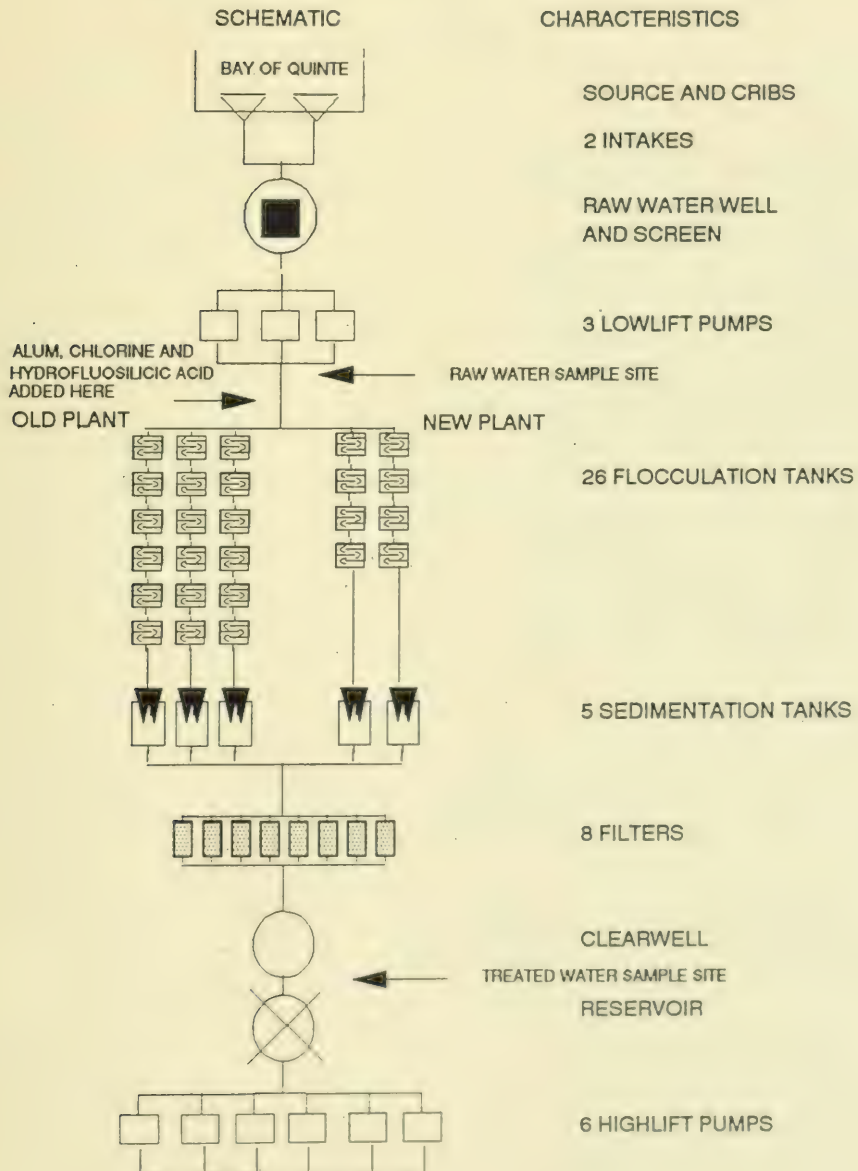


TABLE 1
DRINKING WATER SURVEILLANCE PROGRAM
PLANT GENERAL REPORT

WORKS #: 220001628
PLANT NAME: BELLEVILLE WTP

DISTRICT: BELLEVILLE
REGION: SOUTHEAST
DISTRICT OFFICER: J. TOOLEY

UTM #: 183085504890950

PLANT SUPERINTENDENT: DAVE MIDDLETON

ADDRESS: SIDNEY STREET
BELLEVILLE, ONTARIO
K8N 5B6
(613)966-3651

MUNICIPALITY: BELLEVILLE
AUTHORITY: MUNICIPAL

PLANT INFORMATION

PLANT VOLUME:	-	(X 1000 M3)
DESIGN CAPACITY:	-	(X 1000 M3/DAY)
RATED CAPACITY:	54.500	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
-----	-----
BELLEVILLE	36,792

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER -----	LOCATION -----	FREQUENCY -----
ALGAE	RAW WATER	WEEKLY
FREE CHLORINE RESIDUAL	LAST MIX CHAMBER HIGHLIFT DISCHARGE	CONTINUOUS CONTINUOUS
TOTAL CHLORINE RESIDUAL	LAST MIX CHAMBER HIGHLIFT DISCHARGE	CONTINUOUS CONTINUOUS
COLOUR	HIGHLIFT DISCHARGE	DAILY
FLUORIDE	RAW WATER HIGHLIFT DISCHARGE	DAILY DAILY
PH	RAW WATER HIGHLIFT DISCHARGE	DAILY DAILY
TASTE & ODOUR	RAW WATER HIGHLIFT DISCHARGE	WEEKLY WEEKLY
TEMPERATURE	RAW WATER	DAILY
TURBIDITY	RAW WATER FILTERED WATER HIGHLIFT DISCHARGE	CONTINUOUS CONTINUOUS CONTINUOUS

TABLE 3
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP SAMPLE DAY CONDITIONS FOR 1990

DATE	DELAY * TIME(HRS) (1000H3)	FLOW (1000G3)	TREATMENT CHEMICAL DOSAGE (MG/L)		HYDROFLUOSILICIC ACID
			CHLORINE PRE CHLORINATION	ALUM LIQUID COAGULATION	
JAN 02	4.00	26.500	3.60	42.00	1.30
MAR 06	4.00	27.000	3.75	42.00	1.45
MAY 08	4.00	25.000	4.50	43.00	1.50
JUL 04	4.00	30.000	5.50	43.00	1.50
SEP 05	4.00	30.000	5.20	52.00	1.48
NOV 06	4.00	26.000	3.75	45.00	1.41

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL POSITIVE TRACE			TOTAL POSITIVE TRACE			TOTAL POSITIVE TRACE			TOTAL POSITIVE TRACE		
BACTERIOLOGICAL												
FECAL COLIFORM MF	6	3	0	.	.	.	.	.	.	.	.	.
STANDRD PLATE CNT MF	.	.	.	5	0	0	5	3	0	6	2	0
TOTAL COLIFORM MF	6	2	0	.	.	.	.	.	.	.	.	.
T COLIFORM BCKGRD MF	6	6	0	.	.	.	.	.	.	.	.	.
*TOTAL GROUP BACTERIOLOGICAL	18	11	0	5	0	0	5	3	0	6	2	0
CHEMISTRY (FLD)												
FLD CHLORINE (COMB)	.	.	.	6	6	0	12	12	0	12	11	0
FLD CHLORINE FREE	.	.	.	6	6	0	12	5	0	12	5	0
FLD CHLORINE (TOTAL)	.	.	.	6	6	0	12	12	0	12	11	0
FLD PH	6	6	0	6	6	0	12	12	0	12	12	0
FLD TEMPERATURE	6	6	0	5	5	0	12	12	0	12	12	0
FLD TURBIDITY	6	6	0	6	6	0	.	.	.	.	.	.
*TOTAL SCAN CHEMISTRY (FLD)	18	18	0	35	35	0	60	53	0	60	51	0
CHEMISTRY (LAB)												
ALKALINITY	6	6	0	6	6	0	12	12	0	12	12	0
CALCIUM	6	6	0	6	6	0	12	12	0	12	12	0
CYANIDE	6	0	0	6	0	0	.	.	.	.	.	.
CHLORIDE	6	6	0	6	6	0	12	12	0	12	12	0
COLOUR	6	6	0	6	6	0	12	12	0	12	11	1
CONDUCTIVITY	6	6	0	6	6	0	12	12	0	12	12	0
DISS ORG CARBON	6	6	0	6	6	0	12	12	0	12	12	0
FLUORIDE	6	5	1	6	6	0	12	12	0	12	12	0
HARDNESS	6	6	0	6	6	0	12	12	0	12	12	0
IONCAL	6	6	0	6	6	0	12	12	0	12	12	0
LANGELIERS INDEX	6	6	0	3	3	0	7	7	0	7	7	0
MAGNESIUM	6	6	0	6	6	0	12	12	0	12	12	0
SODIUM	6	6	0	6	6	0	12	12	0	12	12	0
AMMONIUM TOTAL	6	5	0	6	0	1	12	8	4	12	3	7
NITRITE	6	6	0	6	1	4	12	4	8	12	3	9
TOTAL NITRATES	6	6	0	6	6	0	12	12	0	12	12	0
NITROGEN TOT KJELD	6	6	0	6	6	0	12	12	0	12	12	0
PH	6	6	0	6	6	0	12	12	0	12	12	0
PHOSPHORUS FIL REACT	6	3	2	6	0	4	.	.	.	.	.	.
PHOSPHORUS TOTAL	6	6	0	6	0	5	.	.	.	.	.	.
SULPHATE	6	6	0	6	6	0	12	12	0	12	12	0
TURBIDITY	6	6	0	6	6	0	12	12	0	12	12	0
*TOTAL SCAN CHEMISTRY (LAB)	132	121	3	129	100	14	223	211	12	223	204	17

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE

METALS												
SILVER	6	0	0	6	0	0	12	0	3	12	0	0
ALUMINUM	6	6	0	6	6	0	12	12	0	12	12	0
ARSENIC	6	1	5	6	0	5	12	0	12	12	0	10
BARIUM	6	6	0	6	6	0	12	12	0	12	12	0
BORON	6	3	3	6	3	3	12	8	4	12	4	8
BERYLLIUM	6	0	2	6	0	1	12	0	2	12	0	0
CADMIUM	6	0	1	6	0	0	12	0	3	12	0	1
COBALT	6	0	5	6	0	5	12	0	11	12	0	10
CHROMIUM	6	0	5	6	0	5	12	0	10	12	0	9
COPPER	6	0	6	6	1	5	12	12	0	12	10	2
IRON	6	5	1	6	1	2	12	10	2	12	2	10
MERCURY	6	1	1	6	0	1	.	.	.	.	.	.
MANGANESE	6	6	0	6	6	0	12	12	0	12	12	0
MOLYBDENUM	6	0	6	6	0	5	12	0	12	12	0	12
NICKEL	6	0	2	6	0	3	12	5	4	12	1	2
LEAD	6	4	2	6	1	2	12	6	6	12	6	6
ANTIMONY	6	0	6	6	0	6	12	4	8	12	1	11
SELENIUM	6	0	1	6	0	2	12	0	1	12	0	1
STRONTIUM	6	6	0	6	6	0	12	12	0	12	12	0
TITANIUM	6	5	1	6	5	1	12	12	0	12	10	2
THALLIUM	6	0	0	6	0	0	12	0	0	12	0	0
URANIUM	6	0	6	6	0	5	12	0	10	12	0	9
VANADIUM	6	2	4	6	4	2	12	8	4	12	8	4
ZINC	6	4	2	6	5	1	12	12	0	12	12	0

*TOTAL SCAN METALS	144	49	59	144	44	54	276	125	92	276	102	97
*TOTAL GROUP INORGANIC & PHYSICAL	294	188	62	308	179	68	559	389	104	559	357	114

COBALT 60	1	0	0	1	0	0	.	.	.	.	.	.
CESIUM 134	1	0	0	1	0	0	.	.	.	.	.	.
CESIUM 137	1	0	0	1	0	0	.	.	.	.	.	.
GROSS ALPHA COUNT	1	0	0	1	0	0	.	.	.	.	.	.
GROSS BETA COUNT	1	1	0	1	1	0	.	.	.	.	.	.
TRITIUM	1	0	0	1	0	0	.	.	.	.	.	.
IODINE 131	1	0	0	1	0	0	.	.	.	.	.	.

*TOTAL SCAN	7	1	0	7	1	0	0	0	0	0	0	0

CHLOROAROMATICS												
HEXACHLOROBUTADIENE	6	0	0	6	0	0	6	0	0	5	0	0
123 TRICHLOROBENZENE	6	0	0	6	0	0	6	0	0	5	0	0
1234 T-CHLOROBENZENE	6	0	0	6	0	0	6	0	0	5	0	0
1235 T-CHLOROBENZENE	6	0	0	6	0	0	6	0	0	5	0	0
124 TRICHLOROBENZENE	6	0	0	6	0	0	6	0	0	5	0	0
1245 T-CHLOROBENZENE	6	0	0	6	0	0	6	0	0	5	0	0
135 TRICHLOROBENZENE	6	0	0	6	0	0	6	0	0	5	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
HC8	6	0	0	6	0	0	6	0	0	5	0	0
HEXACHLOROETHANE	6	0	0	6	0	0	6	0	0	5	0	0
OCTACHLOROSTYRENE	6	0	0	6	0	0	6	0	0	5	0	0
PENTACHLOROBENZENE	6	0	0	6	0	0	6	0	0	5	0	0
236 TRICHLOROTOLUENE	6	0	0	6	0	0	6	0	1	5	0	0
245 TRICHLOROTOLUENE	6	0	0	6	0	0	6	0	0	5	0	0
26A TRICHLOROTOLUENE	6	0	0	6	0	0	6	0	0	5	0	0
*TOTAL SCAN CHLOROAROMATICS	84	0	0	84	0	0	84	0	1	70	0	0

CHLOROPHENOLS												
234 TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2345 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2356 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
245-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
246-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
PENTACHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
*TOTAL SCAN CHLOROPHENOLS	12	0	0	12	0	0	0	0	0	0	0	0

PAH												
PHENANTHRENE	6	0	1	6	0	0	.	.	.	.	.	.
ANTHRACENE	6	0	0	6	0	0	.	.	.	.	.	.
FLUORANTHENE	6	0	0	6	0	0	.	.	.	.	.	.
PYRENE	6	0	0	6	0	0	.	.	.	.	.	.
BENZO(A)ANTHRACENE	6	0	0	6	0	0	.	.	.	.	.	.
CHRYSENE	6	0	0	6	0	0	.	.	.	.	.	.
DIMETH. BENZ(A)ANTHR	5	0	0	5	0	0	.	.	.	.	.	.
BENZO(E) PYRENE	6	0	0	6	0	0	.	.	.	.	.	.
BENZO(B) FLUORANTHEN	6	0	0	6	0	0	.	.	.	.	.	.
PERYLENE	6	0	0	6	0	0	.	.	.	.	.	.
BENZO(K) FLUORANTHEN	6	0	0	6	0	0	.	.	.	.	.	.
BENZO(A) PYRENE	6	0	0	6	0	0	.	.	.	.	.	.
BENZO(G,H,I) PERYLEN	6	0	0	6	0	0	.	.	.	.	.	.
DIBENZO(A,H) ANTHRAC	6	0	0	6	0	0	.	.	.	.	.	.
INDENO(1,2,3-C,D) PY	6	0	0	6	0	0	.	.	.	.	.	.
BENZO(B) CHRYSENE	6	0	0	6	0	0	.	.	.	.	.	.
CORONENE	6	0	0	6	0	0	.	.	.	.	.	.
*TOTAL SCAN PAH	101	0	1	101	0	0	0	0	0	0	0	0

PESTICIDES & PCB												
ALDRIN	6	0	0	6	0	0	6	0	0	5	0	0
ALPHA BHC	6	0	1	6	0	1	6	0	2	5	0	2
BETA BHC	6	0	0	6	0	0	6	0	0	5	0	0
LINDANE	6	0	0	6	0	0	6	0	0	5	0	0
ALPHA CHLORDANE	6	0	0	6	0	0	6	0	0	5	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
GAMMA CHLORDANE	6	0	0	6	0	0	6	0	0	5	0	0
DIELDRIN	6	0	0	6	0	0	6	0	0	5	0	0
METHOXYCHLOR	6	0	0	6	0	0	6	0	0	5	0	0
ENDOSULFAN I	6	0	0	6	0	0	6	0	0	5	0	0
ENDOSULFAN II	6	0	0	6	0	0	6	0	0	5	0	0
ENDRIN	6	0	0	6	0	0	6	0	0	5	0	0
ENDOSULFAN SULPHATE	6	0	0	6	0	0	6	0	0	5	0	0
HEPTACHLOR EPOXIDE	6	0	0	6	0	0	6	0	0	5	0	0
HEPTACHLOR	6	0	0	6	0	0	6	0	0	5	0	0
MIREX	6	0	0	6	0	0	6	0	0	5	0	0
OXYCHLORDANE	6	0	0	6	0	0	6	0	0	5	0	0
OPDDT	6	0	0	6	0	0	6	0	0	5	0	0
PCB	6	0	0	6	0	0	6	0	0	5	0	0
DDD	6	0	0	6	0	0	6	0	0	5	0	0
PPDDE	6	0	0	6	0	0	6	0	0	5	0	0
PPDDT	6	0	0	6	0	0	6	0	0	5	0	0
AMETRINE	6	0	0	6	0	0	.	.	.	.	.	.
ATRAZINE	6	0	0	6	0	0	.	.	.	.	.	.
ATRATONE	6	0	0	6	0	0	.	.	.	.	.	.
CYANAZINE (BLADEX)	6	0	0	6	0	0	.	.	.	.	.	.
DESETHYLATRAZINE	6	0	0	6	0	0	.	.	.	.	.	.
D-ETHYL SIMAZINE	5	0	0	5	0	0	.	.	.	.	.	.
PROMETONE	6	0	0	6	0	0	.	.	.	.	.	.
PROPACINE	6	0	0	6	0	0	.	.	.	.	.	.
PROMETRYNE	6	0	0	6	0	0	.	.	.	.	.	.
METRIBUZIN (SENCOR)	6	0	0	6	0	0	.	.	.	.	.	.
SIMAZINE	6	0	0	6	0	0	.	.	.	.	.	.
ALACHLOR (LASSO)	6	0	0	6	0	0	.	.	.	.	.	.
METOLACHLOR	6	0	0	6	0	0	.	.	.	.	.	.
HEXACHLOROCYCLOPENTADIEN	1	0	0	1	1	0	1	1	0	1	1	0
*TOTAL SCAN PESTICIDES & PCB	204	0	1	204	1	1	127	1	2	106	1	2
PHENOLICS												
PHENOLICS	6	2	2	6	2	1	.	.	.	.	.	.
*TOTAL SCAN PHENOLICS	6	2	2	6	2	1	0	0	0	0	0	0
SPECIFIC PESTICIDES												
TOXAPHENE	6	0	0	6	0	0	6	0	0	5	0	0
2,4,5-T	2	0	0	2	0	0	.	.	.	.	.	.
2,4-D	2	0	0	2	0	0	.	.	.	.	.	.
2,4-DB	2	0	0	2	0	0	.	.	.	.	.	.
2,4 D PROPIONIC ACID	2	0	0	2	0	0	.	.	.	.	.	.
DICAMBA	1	0	0	1	0	0	.	.	.	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.	.	.	.
SILVEX	2	0	0	2	0	0	.	.	.	.	.	.
DIAZINON	2	0	0	2	0	0	.	.	.	.	.	.
DICHLOROVOS	2	0	0	2	0	0	.	.	.	.	.	.
CHLORPYRIFOS	2	0	0	2	0	0	.	.	.	.	.	.
ETHION	2	0	0	2	0	0	.	.	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.	.	.	.
MALATHION	2	0	0	2	0	0	.	.	.	.	.	.
MEVINPHOS	2	0	0	2	0	0	.	.	.	.	.	.
METHYL PARATHION	2	0	0	2	0	0	.	.	.	.	.	.
METHYLTRITHION	2	0	0	2	0	0	.	.	.	.	.	.
PARATHION	2	0	0	2	0	0	.	.	.	.	.	.
PHORATE	2	0	0	2	0	0	.	.	.	.	.	.
RELDAN	2	0	0	2	0	0	.	.	.	.	.	.
RONNEL	2	0	0	2	0	0	.	.	.	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.	.	.	.
BENONYL	0	0	0	0	0	0	.	.	.	.	.	.
BUGX	0	0	0	0	0	0	.	.	.	.	.	.
CARBOFURAN	2	0	0	2	0	0	.	.	.	.	.	.
CICP	2	0	0	2	0	0	.	.	.	.	.	.
DIALLATE	2	0	0	2	0	0	.	.	.	.	.	.
EPTAM	2	0	0	2	0	0	.	.	.	.	.	.
IPC	2	0	0	2	0	0	.	.	.	.	.	.
PROPOXUR	2	0	0	2	0	0	.	.	.	.	.	.
CARBARYL	2	0	0	2	0	0	.	.	.	.	.	.
BUTYLATE	2	0	0	2	0	0	.	.	.	.	.	.

*TOTAL SCAN SPECIFIC PESTICIDES

57	0	0	57	0	0	6	0	0	5	0	0
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VOLATILES

BENZENE	6	0	0	6	0	2	4	0	1	6	0	2
TOLUENE	6	0	1	6	0	3	4	0	2	6	0	3
ETHYLBENZENE	6	0	0	6	0	4	4	0	3	6	0	3
P-XYLENE	6	0	0	6	0	0	4	0	0	6	0	0
M-XYLENE	6	0	0	6	0	2	4	0	0	6	0	1
O-XYLENE	6	0	1	6	0	1	4	0	0	6	0	1
STYRENE	6	0	0	6	0	3	4	0	3	6	0	4
1,1 DICHLOROETHYLENE	6	0	0	6	0	0	4	0	0	6	0	0
METHYLENE CHLORIDE	6	0	0	6	0	0	4	0	0	6	0	0
1,2 DICHLOROETHYLENE	6	0	0	6	0	0	4	0	0	6	0	0
1,1 DICHLOROETHANE	6	0	0	6	0	0	4	0	0	6	0	0
CHLOROFORM	6	2	2	6	6	0	4	4	0	6	6	0
111, TRICHLOROETHANE	6	0	3	6	0	0	4	0	0	6	0	0
1,2 DICHLOROETHANE	6	0	0	6	0	0	4	0	0	6	0	0
CARBON TETRACHLORIDE	6	0	0	6	0	0	4	0	0	6	0	0
1,2 DICHLOROPROPANE	6	0	0	6	0	0	4	0	0	6	0	0
TRICHLOROETHYLENE	6	0	0	6	0	0	4	0	0	6	0	0
DICHLOROBROMOMETHANE	6	0	2	6	6	0	4	4	0	6	6	0
112 TRICHLOROETHANE	6	0	0	6	0	0	4	0	0	6	0	0
CHLORODIBROMOMETHANE	6	0	0	6	0	6	4	0	4	6	0	6
T-CHLOROETHYLENE	6	0	0	6	0	1	4	0	0	6	0	0
BROMOFORM	6	0	0	6	0	0	4	0	0	6	0	0
1122 T-CHLOROETHANE	6	0	0	6	0	0	4	0	0	6	0	0
CHLOROBENZENE	6	0	0	6	0	0	4	0	0	6	0	0
1,4 DICHLOROBENZENE	6	0	0	6	0	0	4	0	0	6	0	0
1,3 DICHLOROBENZENE	6	0	0	6	0	0	4	0	0	6	0	0
1,2 DICHLOROBENZENE	6	0	0	6	0	0	4	0	0	6	0	0
ETHYLENE DIBROMIDE	6	0	0	6	0	0	4	0	0	6	0	0
TOTL TRIHALOMETHANES	6	0	2	6	6	0	4	4	0	6	6	0

*TOTAL SCAN VOLATILES

174	2	11	174	18	22	116	12	13	174	18	20
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*TOTAL GROUP ORGANIC

645	5	15	645	22	24	333	13	16	355	19	22
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KEY TO TABLE 5 and 6

- A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
 - 1*. MAC for Total Trihalomethanes
 2. Interim Maximum Acceptable Concentration (IMAC)
 3. Aesthetic Objective (AO)
 - 3*. AO for Total Xylenes
 4. Recommended Operational Guideline
- B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
 2. Proposed MAC
 3. Interim MAC
 4. Aesthetic Objective (AO)
- C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
 2. Tentative GV
 3. Aesthetic GV
- D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
 2. Suggested No-Adverse Effect Level (SNAEL)
 3. Lifetime Health Advisory
 4. EPA Ambient Water Quality Criteria
 - 4T. EPA Ambient Water Quality Criteria for Total PAH
- F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
 2. Aesthetic Guideline Level
 3. Maximum Admissable Concentration (MADC)
- G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE
- I NEW YORK STATE AMBIENT WATER GUIDELINE
- N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
UTM	Unreliable: Indeterminate Interference
XP	Positive After X Number Of Hours
T#	(T06) Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
BACTERIOLOGICAL						
FECAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = 0 (A1)		
JAN	3	.	.	.	.	.
MAR	11	.	.	.	.	.
MAY	10 <=>	.	.	.	.	.
JUL	BDL	.	.	.	.	.
SEP	6	.	.	.	.	.
NOV	BDL	.	.	.	.	.
STANDRD PLATE CNT MF (COUNT/ML)			DET'N LIMIT = 0	GUIDELINE = 500/ML (A3)		
JAN	.	1 <=>	.	4 <=>	.	4 <=>
MAR	.	1 <=>	.	5 <=>	.	3 <=>
MAY	.	2 <=>	.	1LA	.	1 <=>
JUL	.	0 <=>	.	2400 >	.	1200
SEP	.	.	.	2400 >	.	2400 >
NOV	.	0 <=>	.	27	.	7 <=>
TOTAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = 5/100ML(A1)		
JAN	56	.	.	.	.	.
MAR	720	.	.	.	.	.
MAY	10 <=>	.	.	.	.	.
JUL	100 <=>	.	.	.	.	.
SEP	BDL	.	.	.	.	.
NOV	160 <=>	.	.	.	.	.
T COLIFORM BCKGRD MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = N/A		
JAN	2560	.	.	.	.	.
MAR	1640	.	.	.	.	.
MAY	21000	.	.	.	.	.
JUL	40000 >	.	.	.	.	.
SEP	48000 >	.	.	.	.	.
NOV	1780	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (FLD)							
FLD CHLORINE (COMB) (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A			
JAN	.	.250	.300	.200	.100	.200	.200
MAR	.	.260	.100	.200	.100	.200	.200
MAY	.	.230	.100	.200	.100	.200	.200
JUL	.	.290	.100	.200	.000	.100	.100
SEP	.	.300	.300	.300	.100	.200	.200
NOV	.	.280	.300	.200	.100	.200	.200
FLD CHLORINE FREE (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A			
JAN	.	.700	.000	.100	.000	.100	.100
MAR	.	.650	.000	.100	.000	.100	.100
MAY	.	.650	.000	.100	.000	.500	.500
JUL	.	.910	.000	.100	.000	.000	.000
SEP	.	.900	.000	.000	.000	.100	.100
NOV	.	.930	.000	.100	.000	.100	.100
FLD CHLORINE (TOTAL) (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A			
JAN	.	.950	.300	.300	.100	.300	.300
MAR	.	.910	.100	.300	.100	.300	.300
MAY	.	.880	.100	.300	.100	.700	.700
JUL	.	1.200	.100	.300	.000	.100	.100
SEP	.	1.200	.300	.300	.100	.300	.300
NOV	.	1.210	.300	.300	.100	.300	.300
FLD PH (DMNSLESS)		DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)			
JAN	7.400	6.700	7.000	6.800	7.000	6.800	6.800
MAR	7.700	6.800	7.000	6.800	7.000	6.800	6.900
MAY	8.200	6.900	7.000	6.800	7.000	6.800	6.800
JUL	7.750	6.700	7.000	6.800	7.100	6.900	6.900
SEP	8.000	6.800	7.000	6.800	6.800	7.100	7.100
NOV	7.800	6.800	7.000	6.800	7.000	7.000	7.000
FLD TEMPERATURE (DEG.C)		DET'N LIMIT = N/A		GUIDELINE = 15 (A3)			
JAN	1.500	4.000	22.000	8.000	20.000	6.000	22.000
MAR	1.500	2.000	21.000	6.500	21.000	4.000	21.000
MAY	15.000	15.000	22.000	13.000	23.000	10.000	23.000
JUL	21.500	.	22.000	19.000	25.000	19.500	25.000
SEP	23.000	23.000	22.000	23.500	23.000	22.000	22.000
NOV	9.000	9.000	21.500	16.000	19.000	12.500	19.000
FLD TURBIDITY (FTU)		DET'N LIMIT = N/A		GUIDELINE = 1 (A1)			
JAN	1.100	.340	.	.	.	.	.
MAR	1.400	.300	.	.	.	.	.
MAY	2.900	.170	.	.	.	.	.
JUL	5.600	.240	.	.	.	.	.
SEP	9.400	.200	.	.	.	.	.
NOV	4.600	.120	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (LAB)						
ALKALINITY (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 30-500 (A3)		
JAN	115.500	86.400	88.800	89.000	86.800	87.300
MAR	107.900	78.400	78.500	78.500	78.400	77.900
MAY	102.400	74.300	76.300	75.000	75.100	75.800
JUL	111.700	80.200	81.500	82.000	80.000	79.800
SEP	107.600	73.200	75.400	74.100	74.100	74.000
NOV	112.700	83.700	83.500	83.000	83.600	83.000
CALCIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 100 (F2)		
JAN	44.800	45.300	45.800	46.300	45.500	45.100
MAR	45.300	44.000	44.410	45.980	44.290	44.580
MAY	43.100	41.600	43.000	42.700	41.800	42.600
JUL	44.800	44.000	45.000	44.800	44.600	44.000
SEP	40.600	41.200	42.400	42.400	40.800	41.200
NOV	44.200	44.200	42.200	42.100	41.100	41.500
CHLORIDE (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 250 (A3)		
JAN	23.300	27.300	17.300	18.600	25.400	20.300
MAR	12.900	16.100	17.200	16.900	16.600	16.500
MAY	9.000	12.600	13.000	12.700	12.700	12.600
JUL	10.000	14.800	15.300	15.000	15.400	15.400
SEP	10.800	15.400	17.800	16.600	16.700	16.500
NOV	11.400	14.000	13.500	13.200	13.100	12.800
COLOUR (HZU)			DET'N LIMIT = 0.5	GUIDELINE = 5 (A3)		
JAN	20.000	4.500	6.500	6.500	6.000	5.000
MAR	20.500	3.500	4.500	5.000	3.500	3.000
MAY	21.500	4.000	4.500	6.000	4.000	3.500
JUL	16.500	3.000	4.500	4.500	4.500	4.500
SEP	13.500	2.500	4.000	4.500	4.000	2.000 <1
NOV	10.500	3.000	4.500	4.500	3.500	3.500
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1.	GUIDELINE = 400 (F2)		
JAN	330	347	316	317	341	324
MAR	279	292	297	295	295	295
MAY	249	264	270	267	266	267
JUL	267	281	283	283	283	281
SEP	263	279	284	281	282	281
NOV	277	293	292	289	290	289
DISS ORG CARBON (MG/L)			DET'N LIMIT = .100	GUIDELINE = 5.0 (A3)		
JAN	6.400	4.400	4.200	4.200	4.400	4.300
MAR	5.900	4.000	3.600	3.800	3.800	3.700
MAY	5.700	4.000	3.600	3.600	3.800	3.800
JUL	5.700	4.100	3.700	3.700	3.700	3.900
SEP	6.000	4.000	3.600	3.600	3.600	3.700
NOV	5.600	3.800	3.600	3.600	3.800	3.700
FLUORIDE (MG/L)			DET'N LIMIT = 0.01	GUIDELINE = 2.4 (A1)		
JAN	.100	1.060	1.200	1.100	1.120	1.060
MAR	.060	1.240	1.300	1.220	1.300	1.200
MAY	.080	1.220	1.300	1.240	1.240	1.220
JUL	.080	1.240	1.280	1.240	1.260	1.320
SEP	.020 <1	1.180	1.140	1.180	1.200	1.220
NOV	.140	1.160	1.180	1.180	1.180	1.200

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
HARDNESS (MG/L)			DET'N LIMIT = 0.5	GUIDELINE = 80-100 (A4)		
JAN	130.500	131.500	132.800	134.400	132.000	131.200
MAR	130.400	126.700	128.000	132.000	129.000	129.000
MAY	122.300	118.800	122.300	121.400	119.300	121.500
JUL	130.000	128.000	131.000	130.000	130.000	128.000
SEP	119.000	122.000	124.000	124.000	120.000	121.000
NOV	128.200	128.300	124.800	124.000	122.200	122.500
IONCAL (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A		
JAN	2.843	.853	1.248	.117	.663	.813
MAR	3.343	2.295	2.158	5.827	2.402	3.122
MAY	4.069	2.271	2.628	4.127	2.194	3.918
JUL	4.336	3.941	4.998	4.546	4.740	3.122
SEP	.596	4.175	.886	3.405	.481	1.726
NOV	1.135	.452	1.799	1.943	2.553	2.428
LANGELIERS INDEX (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A		
JAN	.540	.177	.406	.352	.101	.092
MAR	.428	-.278	-.045	-.100	-.226	-.166
MAY	.536	-.055	-.061	-.061	-.079	-.107
JUL	.593	.166	.242	-.193	.130	.174
SEP	.456	-.071	.052	-.004	.028	-.127
NOV	.537	.232	.181	.169	.201	.242
MAGNESIUM (MG/L)			DET'N LIMIT = 0.10	GUIDELINE = 30 (F2)		
JAN	4.500	4.500	4.500	4.550	4.500	4.500
MAR	4.150	4.050	4.250	4.150	4.400	4.300
MAY	3.550	3.600	3.650	3.600	3.650	3.700
JUL	4.500	4.300	4.600	4.400	4.500	4.300
SEP	4.400	4.500	4.400	4.400	4.500	4.500
NOV	4.300	4.350	4.700	4.600	4.750	4.600
SODIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 200 (A4)		
JAN	14.300	15.000	8.400	9.400	13.700	10.700
MAR	7.900	8.000	8.500	8.400	7.800	7.700
MAY	4.700	4.600	4.700	4.900	4.700	4.800
JUL	6.000	6.000	5.800	6.000	6.000	6.200
SEP	6.600	7.200	6.800	6.800	6.800	7.000
NOV	6.000	6.100	5.800	5.800	5.700	5.500
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = 0.05 (F2)		
JAN	.058	BDL	.010	.004 <T	.004 <T	.002 <T
MAR	.034	BDL	.014	.006 <T	.008 <T	BDL
MAY	.034	BDL	.020	.002 <T	.004 <T	.004 <T
JUL	.082	BDL	.002 <T	.016	.024	BDL
SEP	.070	BDL	.036	.022	.014	.012
NOV	.024	.004 <T	.016	.012	.006 <T	.006 <T
NITRITE (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 1 (A1)		
JAN	.014	.004 <T	.007	.005	.004 <T	.005
MAR	.012	.001 <T	.002 <T	.001 <T	.002 <T	.001 <T
MAY	.006	BDL	.002 <T	.002 <T	.002 <T	.002 <T
JUL	.016	.006	.008	.011	.008	.018
SEP	.100	.001 <T	.002 <T	.002 <T	.002 <T	.002 <T
NOV	.006	.001 <T	.001 <T	.001 <T	.001 <T	.001 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
TOTAL NITRATES (MG/L)		DET'N LIMIT = 0.005		GUIDELINE = 10		(A1)	
JAN	.280	.280	.310	.285	.275	.290	.290
MAR	.420	.420	.480	.420	.425	.425	.425
MAY	.055	.065	.095	.080	.065	.060	.060
JUL	.055	.050	.050	.045	.070	.215	.215
SEP	.125	.025	.045	.025	.025	.030	.030
NOV	.125	.130	.145	.135	.135	.115	.115
NITROGEN TOT KJELD (MG/L)		DET'N LIMIT = 0.02		GUIDELINE = N/A			
JAN	.510	.310	.330	.310	.330	.320	.320
MAR	.490	.270	.290	.310	.290	.290	.290
MAY	.680	.290	.330	.270	.250	.290	.290
JUL	.640	.310	.390	.320	.330	.320	.320
SEP	.750	.250	.300	.270	.260	.250	.250
NOV	.740	.270	.370	.280	.290	.270	.270
PH (DMNSLESS)		DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)			
JAN	8.270	8.030	8.240	8.180	7.950	7.940	7.940
MAR	8.170	7.620	7.850	7.780	7.670	7.730	7.730
MAY	8.310	7.880	7.850	7.860	7.850	7.810	7.810
JUL	8.320	8.050	8.110	8.060	8.010	8.060	8.060
SEP	8.240	7.880	7.980	7.930	7.980	7.820	7.820
NOV	8.270	8.100	8.070	8.060	8.100	8.140	8.140
PHOSPHORUS FIL REACT (MG/L)		DET'N LIMIT = 0.0005		GUIDELINE = N/A			
JAN	BDL	.000 <T	.	.	.	.	.
MAR	.001 <T	BDL	.	.	.	.	.
MAY	.002 <T	.001 <T	.	.	.	.	.
JUL	.002	.000 <T	.	.	.	.	.
SEP	.010	BDL	.	.	.	.	.
NOV	.003	.001 <T	.	.	.	.	.
PHOSPHORUS TOTAL (MG/L)		DET'N LIMIT = 0.002		GUIDELINE = .40 (F2)			
JAN	.025	.006 <T	.	.	.	.	.
MAR	.015	BDL	.	.	.	.	.
MAY	.027	.004 <T	.	.	.	.	.
JUL	.039	.004 <T	.	.	.	.	.
SEP	.060	.005 <T	.	.	.	.	.
NOV	.039	.006 <T	.	.	.	.	.
SULPHATE (MG/L)		DET'N LIMIT = .200		GUIDELINE = 500 (A3)			
JAN	16.180	38.120	37.140	37.110	37.800	37.120	37.120
MAR	14.470	36.560	37.740	36.530	37.370	37.090	37.090
MAY	11.420	32.160	32.910	32.290	32.230	31.930	31.930
JUL	11.200	32.620	32.400	32.150	33.150	33.060	33.060
SEP	9.550	35.060	35.490	35.170	35.330	35.460	35.460
NOV	12.960	35.470	35.280	35.730	34.000	34.830	34.830
TURBIDITY (FTU)		DET'N LIMIT = 0.05		GUIDELINE = 1 (A1)			
JAN	1.550	.750	.820	1.090	.650	1.220	1.220
MAR	2.800	1.400	1.400	2.400	1.500	2.000	2.000
MAY	3.300	4.700	.620	.830	.520	.680	.680
JUL	4.900	.380	.610	.710	.620	.790	.790
SEP	6.300	.290	.580	.570	.460	.420	.420
NOV	6.000	.320	.620	.750	.710	.760	.760

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
		STANDING		FREE FLOW		STANDING	
METALS		DET'N LIMIT = 0.05		GUIDELINE = 50 (A1)			
SILVER (UG/L)							
JAN	BDL	BDL	.260 <T	BDL	BDL	BDL	BDL
MAR	BDL	BDL	.090 <T	BDL	BDL	BDL	BDL
MAY	BDL	BDL		BDL	BDL	BDL	BDL
JUL	BDL	BDL	.080 <T	BDL	BDL	BDL	BDL
SEP	BDL	BDL		BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	BDL	BDL
ALUMINUM (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 100 (A4)			
JAN	36.000	310.000	230.000	250.000	240.000	280.000	
MAR	28.000	280.000	200.000	280.000	180.000	260.000	
MAY	71.000	200.000	160.000	180.000	180.000	180.000	
JUL	40.000	170.000	150.000	150.000	160.000	170.000	
SEP	40.000	120.000	100.000	100.000	170.000	110.000	
NOV	150.000	180.000	130.000	140.000	140.000	160.000	
ARSENIC (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 25 (A1)			
JAN	.250 <T	.280 <T	.330 <T	.220 <T	.220 <T	.250 <T	
MAR	.330 <T	.230 <T	.170 <T	.240 <T	.180 <T	BDL	
MAY	.320 <T	BDL	.220 <T	.240 <T	.250 <T	.240 <T	
JUL	.350 <T	.130 <T	.430 <T	.440 <T	.520 <T	.400 <T	
SEP	1.300	.540 <T	.320 <T	.420 <T	.310 <T	.430 <T	
NOV	.750 <T	.350 <T	.260 <T	.340 <T	.330 <T	BDL	
BARIUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 1000 (A2)			
JAN	42.000	40.000	44.000	38.000	42.000	39.000	
MAR	36.000	33.000	38.000	33.000	35.000	32.000	
MAY	35.000	33.000	37.000	33.000	33.000	32.000	
JUL	37.000	36.000	37.000	37.000	37.000	36.000	
SEP	38.000	37.000	37.000	37.000	38.000	37.000	
NOV	39.000	37.000	36.000	36.000	37.000	37.000	
BORON (UG/L)		DET'N LIMIT = 2.00		GUIDELINE = 5000 (A1)			
JAN	15.000 <T	15.000 <T	17.000 <T	14.000 <T	14.000 <T	15.000 <T	
MAR	27.000	25.000	29.000	21.000	12.000 <T	17.000 <T	
MAY	54.000	52.000	36.000	47.000	26.000	46.000	
JUL	18.000 <T	19.000 <T	22.000	18.000 <T	18.000 <T	18.000 <T	
SEP	32.000	30.000	28.000	30.000	24.000	29.000	
NOV	16.000 <T	16.000 <T	22.000	16.000 <T	16.000 <T	16.000 <T	
BERYLLIUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 6800 (D4)			
JAN	BDL	BDL	BDL	BDL	BDL	BDL	
MAR	BDL	BDL	BDL	BDL	BDL	BDL	
MAY	.070 <T	.060 <T	.060 <T	.070 <T	BDL	BDL	
JUL	BDL	BDL	BDL	BDL	BDL	BDL	
SEP	.070 <T	BDL	BDL	BDL	BDL	BDL	
NOV	BDL	BDL	BDL	BDL	BDL	BDL	
CADMIUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 5 (A1)			
JAN	BDL	BDL	.090 <T	BDL	BDL	BDL	
MAR	.060 <T	BDL	.080 <T	BDL	BDL	.060 <T	
MAY	BDL	BDL	BDL	BDL	BDL	BDL	
JUL	BDL	BDL	BDL	BDL	BDL	BDL	
SEP	BDL	BDL	BDL	BDL	BDL	BDL	
NOV	BDL	BDL	.090 <T	BDL	BDL	BDL	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
				STANDING		STANDING	
				FREE FLOW		FREE FLOW	
COBALT (UG/L)		DET'N LIMIT = 0.02		GUIDELINE = N/A			
JAN	.070 <T	.070 <T	.120 <T	.040 <T	.230 <T	.080 <T	
MAR	.120 <T	.060 <T	.220 <T	.110 <T	.090 <T	.090 <T	
MAY	.140 <T	.120 <T	.140 <T	.090 <T	.190 <T	.140 <T	
JUL	.180 <T	.180 <T	.260 <T	.100 <T	.240 <T	.200 <T	
SEP	BDL	BDL	.030 <T	BDL	BDL	BDL	
NOV	.090 <T	.050 <T	.090 <T	.050 <T	.100 <T	.070 <T	
CHROMIUM (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = 50 (A1)			
JAN	BDL	BDL	BDL	BDL	BDL	BDL	
MAR	3.300 <T	3.100 <T	2.700 <T	2.000 <T	BDL	1.000 <T	
MAY	2.200 <T	3.800 <T	2.300 <T	3.100 <T	2.100 <T	3.500 <T	
JUL	2.100 <T	3.000 <T	2.300 <T	2.500 <T	2.500 <T	2.600 <T	
SEP	2.700 <T	3.700 <T	2.800 <T	3.400 <T	2.700 <T	3.700 <T	
NOV	1.700 <T	2.500 <T	2.300 <T	2.300 <T	2.300 <T	2.300 <T	
COPPER (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = 1000 (A3)			
JAN	1.200 <T	1.200 <T	170.000	16.000	190.000	6.200	
MAR	1.000 <T	.630 <T	190.000	16.000	160.000	5.000 <T	
MAY	.930 <T	8.500	150.000	21.000	160.000	7.200	
JUL	1.100 <T	.780 <T	120.000	16.000	61.000	7.100	
SEP	.890 <T	1.300 <T	120.000	17.000	170.000	8.900	
NOV	.770 <T	.560 <T	110.000	14.000	54.000	4.700 <T	
IRON (UG/L)		DET'N LIMIT = 6.00		GUIDELINE = 300 (A3)			
JAN	30.000 <T	BDL	71.000	110.000	56.000 <T	30.000 <T	
MAR	62.000	BDL	84.000	150.000	52.000 <T	20.000 <T	
MAY	61.000	470.000	61.000	140.000	62.000	31.000 <T	
JUL	75.000	9.500 <T	54.000 <T	72.000	55.000 <T	60.000 <T	
SEP	100.000	6.100 <T	51.000 <T	82.000	130.000	35.000 <T	
NOV	94.000	BDL	74.000	82.000	51.000 <T	31.000 <T	
MERCURY (UG/L)		DET'N LIMIT = 0.02		GUIDELINE = 1 (A1)			
JAN	.030 <T	.020 <T	.	.	.	.	
MAR	BDL	BDL	.	.	.	.	
MAY	BDL	BDL	.	.	.	.	
JUL	BDL	BDL	.	.	.	.	
SEP	.440	BDL	.	.	.	.	
NOV	BDL	BDL	.	.	.	.	
MANGANESE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 50 (A3)			
JAN	9.800	3.700	4.800	6.100	5.300	4.400	
MAR	9.100	1.900	3.700	4.600	3.900	3.100	
MAY	30.000	3.300	3.700	5.300	4.100	2.900	
JUL	23.000	2.200	4.100	3.900	4.800	4.000	
SEP	89.000	3.100	5.400	6.500	5.800	4.500	
NOV	30.000	2.200	4.400	5.000	4.700	3.800	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
MOLYBDENUM (UG/L)				DET'N LIMIT = 0.05	GUIDELINE = N/A		
JAN	.390 <T	.370 <T	.370 <T	.370 <T	.380 <T	.350 <T	.350 <T
MAR	.250 <T	.380 <T	.410 <T	.340 <T	.360 <T	.330 <T	.330 <T
MAY	.150 <T	BDL	.230 <T	.180 <T	.280 <T	.230 <T	.230 <T
JUL	.300 <T	.350 <T	.420 <T	.300 <T	.370 <T	.330 <T	.330 <T
SEP	.330 <T	.420 <T	.470 <T	.330 <T	.460 <T	.370 <T	.370 <T
NOV	.340 <T	.430 <T	.460 <T	.450 <T	.410 <T	.410 <T	.410 <T
NICKEL (UG/L)				DET'N LIMIT = 0.20	GUIDELINE = 350 (D3)		
JAN	.720 <T	.290 <T	2.800	BDL	BDL	BDL	BDL
MAR	BDL	BDL	4.100	.460 <T	BDL	BDL	BDL
MAY	.490 <T	.350 <T	5.100	.360 <T	63.000	.300 <T	.300 <T
JUL	BDL	.460 <T	5.500	.310 <T	BDL	.370 <T	.370 <T
SEP	BDL	BDL	2.400	BDL	BDL	BDL	BDL
NOV	BDL	BDL	.710 <T	BDL	BDL	BDL	BDL
LEAD (UG/L)				DET'N LIMIT = 0.05	GUIDELINE = 10. (A1)		
JAN	1.100	.140 <T	.610	.100 <T	2.300	.220 <T	.220 <T
MAR	.220 <T	BDL	.600	.080 <T	1.900	.110 <T	.110 <T
MAY	.390 <T	2.500	.640	.200 <T	3.400	.210 <T	.210 <T
JUL	.580	BDL	.670	.140 <T	1.000	.280 <T	.280 <T
SEP	.570	.100 <T	.530	.110 <T	2.700	.280 <T	.280 <T
NOV	.620	BDL	.560	.100 <T	1.700	.160 <T	.160 <T
ANTIMONY (UG/L)				DET'N LIMIT = 0.05	GUIDELINE = 146 (D4)		
JAN	.450 <T	.350 <T	.600	.460 <T	.510	.380 <T	.380 <T
MAR	.310 <T	.450 <T	.520	.370 <T	.410 <T	.380 <T	.380 <T
MAY	.460 <T	.320 <T	.310 <T	.190 <T	.380 <T	.430 <T	.430 <T
JUL	.370 <T	.450 <T	.660	.630	.450 <T	.450 <T	.450 <T
SEP	.370 <T	.490 <T	.470 <T	.450 <T	.460 <T	.360 <T	.360 <T
NOV	.360 <T	.390 <T	.450 <T	.500 <T	.470 <T	.470 <T	.470 <T
SELENIUM (UG/L)				DET'N LIMIT = 1.00	GUIDELINE = 10 (A1)		
JAN	BDL	1.100 <T	BDL	BDL	BDL	BDL	BDL
MAR	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MAY	BDL	BDL	BDL	BDL	BDL	BDL	BDL
JUL	1.800 <T	1.100 <T	1.400 <T	BDL	1.400 <T	BDL	BDL
SEP	BDL	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	BDL	BDL
STRONTIUM (UG/L)				DET'N LIMIT = 0.10	GUIDELINE = N/A		
JAN	150.000	150.000	160.000	150.000	150.000	150.000	150.000
MAR	130.000	130.000	140.000	130.000	130.000	130.000	130.000
MAY	130.000	130.000	130.000	130.000	130.000	120.000	120.000
JUL	130.000	130.000	140.000	140.000	130.000	130.000	130.000
SEP	150.000	140.000	140.000	140.000	140.000	140.000	140.000
NOV	140.000	130.000	130.000	140.000	140.000	140.000	140.000
TITANIUM (UG/L)				DET'N LIMIT = 0.50	GUIDELINE = N/A		
JAN	4.700 <T	4.800 <T	5.900	5.500	5.000 <T	4.600 <T	4.600 <T
MAR	6.700	6.000	6.900	6.000	5.500	5.300	5.300
MAY	7.900	7.000	7.000	6.800	7.100	6.700	6.700
JUL	12.000	13.000	12.000	12.000	12.000	11.000	11.000
SEP	9.900	10.000	10.000	10.000	10.000	9.700	9.700
NOV	6.700	5.200	5.500	5.200	5.400	5.700	5.700

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
				STANDING		FREE FLOW	
				STANDING		FREE FLOW	
URANIUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 100 (A1)			
JAN	.280 <T	.130 <T	.110 <T	.110 <T	.130 <T	.100 <T	
MAR	.220 <T	.120 <T	.100 <T	.080 <T	.080 <T	.080 <T	
MAY	.170 <T	.120 <T	.060 <T	BDL	.060 <T	.060 <T	
JUL	.150 <T	.080 <T	.070 <T	.060 <T	BDL	BDL	
SEP	.090 <T	BDL	BDL	.070 <T	BDL	.060 <T	
NOV	.220 <T	.100 <T	.070 <T	.090 <T	.080 <T	.100 <T	
VANADIUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = N/A			
JAN	.330 <T	.240 <T	.340 <T	.240 <T	.320 <T	.210 <T	
MAR	.300 <T	.220 <T	.260 <T	.230 <T	.240 <T	.190 <T	
MAY	.410 <T	2.100	1.200	1.300	1.500	1.700	
JUL	.600	1.800	1.300	1.300	1.700	1.500	
SEP	.880	2.300	1.300	1.600	2.000	2.000	
NOV	.480 <T	1.700	1.400	1.400	1.500	1.700	
ZINC (UG/L)		DET'N LIMIT = 0.20		GUIDELINE = 5000 (A3)			
JAN	3.000	3.100	71.000	2.400	35.000	2.800	
MAR	2.400	1.800 <T	130.000	3.500	23.000	2.900	
MAY	1.500 <T	4.700	85.000	2.500	240.000	2.500	
JUL	2.500	3.100	91.000	3.800	9.700	3.800	
SEP	1.500 <T	3.000	57.000	5.300	28.000	4.400	
NOV	2.700	3.700	36.000	5.000	39.000	5.600	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHLOROAROMATICS						
236 TRICHLOROTOLUENE (NG/L)			DET'N LIMIT = 5.000		GUIDELINE = N/A	
JAN	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	!TS
JUL	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	10.000 <T	.	BDL
HEXACHLOROCYCLOPENTADIENE (NG/L)			DET'N LIMIT = 5.000		GUIDELINE = 206000 (D4)	
NOV	BDL	315.000	.	140.000	.	260.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PAH						
PHENANTHRENE (NG/L)			DET'N LIMIT = 10.		GUIDELINE = N/A	
JAN	BDL	BDL	.	.	.	.
MAR	BDL	BDL	.	.	.	.
MAY	BDL	BDL	.	.	.	.
JUL	BDL	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
NOV	20,000 <T	BDL	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
				STANDING		FREE FLOW	
				FREE FLOW		STANDING	
				FREE FLOW		STANDING	

PESTICIDES & PCB							
ALPHA BHC (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 700 (G)			
JAN	BDL	BDL	.	BDL	.	.	2.000 <T
MAR	1.000 <T	1.000 <T	.	2.000 <T	.	.	1.000 <T
MAY	BDL	BDL	.	BDL	.	.	!IS
JUL	BDL	BDL	.	1.000 <T	.	.	BDL
SEP	BDL	BDL	.	BDL	.	.	BDL
NOV	BDL	BDL	.	BDL	.	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHENOLICS						
PHENOLICS (UG/L)	)		DET'N LIMIT = .200		GUIDELINE = 2	(A4)
JAN	4.400	4.400	.	.	.	.
MAR	1.600	1.000	.	.	.	.
MAY	BDL	BDL	.	.	.	.
JUL	.600 <T	BDL	.	.	.	.
SEP	.600 <T	.600 <T	.	.	.	.
NOV	BDL	BDL	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
VOLATILES						
BENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
JAN	BDL	BDL	.	1U	.	BDL
MAR	BDL	.100 <T	.	.150 <T	.	.100 <T
MAY	BDL	.100 <T	.	1U	.	.050 <T
JUL	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
TOLUENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 24 (A3)		
JAN	.100 <T	BDL	.	1U	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	.150 <T	.	1U	.	.100 <T
JUL	BDL	.150 <T	.	.050 <T	.	.100 <T
SEP	BDL	.050 <T	.	.050 <T	.	.050 <T
NOV	BDL	BDL	.	BDL	.	BDL
ETHYLBENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)		
JAN	BDL	BDL	.	1U	.	BDL
MAR	BDL	.150 <T	.	.200 <T	.	.100 <T
MAY	BDL	.150 <T	.	1U	.	.150 <T
JUL	BDL	.100 <T	.	.100 <T	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	.100 <T	.	.100 <T	.	.050 <T
M-XYLENE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 300 (A3*)		
JAN	BDL	BDL	.	1U	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	.200 <T	.	1U	.	.100 <T
JUL	BDL	.100 <T	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
O-XYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 300 (A3*)		
JAN	BDL	BDL	.	1U	.	.050 <T
MAR	.100 <T	BDL	.	BDL	.	BDL
MAY	BDL	.050 <T	.	1U	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
STYRENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)		
JAN	BDL	BDL	.	1U	.	BDL
MAR	BDL	.100 <T	.	.300 <T	.	.150 <T
MAY	BDL	.100 <T	.	1U	.	.150 <T
JUL	BDL	.050 <T	.	.200 <T	.	.050 <T
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	.150 <T	.	.050 <T
CHLOROFORM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)		
JAN	1.300	101.600	.	1U	.	98.100
MAR	.200 <T	91.200	.	76.200	.	94.200
MAY	.400 <T	126.800	.	1U	.	120.300
JUL	BDL	123.800	.	110.000	.	122.800
SEP	BDL	121.900	.	104.500	.	113.100
NOV	1.100	76.000	.	63.100	.	73.100

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLEVILLE WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
111, TRICHLOROETHANE (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 200 (D1)		
JAN	.060 <T	BDL	.	IU	.	BDL
MAR	.040 <T	BDL	.	BDL	.	BDL
MAY	.060 <T	BDL	.	IU	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DICHLOROBROMOMETHANE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 350 (A1+)		
JAN	.100 <T	7.500	.	IU	.	7.100
MAR	BDL	5.850	.	5.150	.	5.950
MAY	BDL	5.500	.	IU	.	5.350
JUL	BDL	8.050	.	6.850	.	7.700
SEP	BDL	10.550	.	10.200	.	10.850
NOV	.150 <T	7.200	.	5.950	.	6.750
CHLORODIBROMOMETHANE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)		
JAN	BDL	.400 <T	.	IU	.	.300 <T
MAR	BDL	.200 <T	.	.200 <T	.	.200 <T
MAY	BDL	.200 <T	.	IU	.	.100 <T
JUL	BDL	.300 <T	.	.300 <T	.	.300 <T
SEP	BDL	.300 <T	.	.400 <T	.	.400 <T
NOV	BDL	.300 <T	.	.200 <T	.	.200 <T
T-CHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (D1)		
JAN	BDL	.100 <T	.	IU	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	IU	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
TOTAL TRIHALOMETHANES (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 350 (A1)		
JAN	1.450 <T	109.500	.	IU	.	105.550
MAR	BDL	97.250	.	81.500	.	100.400
MAY	BDL	132.500	.	IU	.	125.800
JUL	BDL	132.150	.	117.150	.	130.800
SEP	BDL	132.700	.	115.000	.	124.350
NOV	1.250 <T	83.500	.	69.250	.	80.050

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.2	30-500 (A3)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.2	100 (F2)
CHLORIDE	MG/L	0.2	250 (A3)
COLOUR	TCU	0.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.0	400 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0 (A3)
FLUORIDE	MG/L	0.01	2.4 (A1)
HARDNESS	MG/L	0.5	80-100 (A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.1	30.0 (F2)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
SODIUM	MG/L	0.2	200 (A4)
SULPHATE	MG/L	0.2	500 (A3)
TOTAL NITRATES	MG/L	0.005	10.0 (A1)
TURBIDITY	FTU	0.05	1.0 (A1)
CHLOROAROMATICS			
123 TRICHLOROBENZENE	NG/L	5.0	N/A
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A
124 TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A
236 TRICHLOROTOLUENE	NG/L	5.0	N/A
245 TRICHLOROTOLUENE	NG/L	5.0	N/A
26A TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
234 TRICHLOROPHENOL	NG/L	100.0	N/A
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)

METALS

ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)

PAH

ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A

PESTICIDES & PCB

ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAGINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLORO BUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
2,4-DICHLOROPHENOXYBUTYRIC ACID (2,4-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALLATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORO-DIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHYLENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

- i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;
- ii/ the water being sampled is not being modified by the sampling system;
- iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and
- iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P)

VOLATILES

CLASS: HEALTH METHOD: POCODO UNIT: µg/L

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION: NAME: BENZENE

CAS#: 71-43-2

MOLECULAR FORMULAE: C_6H_6

DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L

SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27).
CYCLOHEXATRIENE (41).

CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).

PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41).
THRESHOLD ODOUR: 0.5 - 10 PPM IN WATER
THRESHOLD TASTE: 0.5 mg/L IN WATER (39).

ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).

SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45);
MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:

MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)
SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (Caution: HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC), (OWTRI), (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled

Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (Caution: NaOH is corrosive)
Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) (Caution: HNO_3 & $\text{K}_2\text{Cr}_2\text{O}_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

Steps:

1. Let sampling water tap run for an adequate time to clear the sample line.
2. Record time of day on submission sheet.
3. Record temperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (Caution: HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked

Metals

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap three times
- fill to 2 cm from top
- add 10 drops nitric acid HNO_3
(Caution: HNO_3 is corrosive)

Volatiles (duplicate)
(OPOPUP)

- 45 mL glass vial with septum
(teflon side must be in contact
with sample)
- do not rinse bottle, preservative
has been added
- fill bottle completely without
bubbles

Organics
(OWOC) (OAPAHX)

- 1 L amber glass bottle per scan
- do not rinse bottle
- fill to 2 cm from top

Steps:

1. Record time of day on submission sheet.
2. Let cold water flow for five minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total),
turbidity and pH on submission sheet.

